

By the Author
ON THE
superior to
CURE OF SQUINTING

BY THE DIVISION OF
ONE OF THE STRAIGHT MUSCLES OF THE EYE,
&c. &c. &c.

BEING THE HALF-YEARLY REPORT
LAID BEFORE THE
Governors of the Royal Westminster Ophthalmic Hospital,
CHARING CROSS,
AT THEIR GENERAL MEETING
On the 25th July, 1840.

By CHARLES W. G. GUTHRIE, JUN.

ASSISTANT-SURGEON TO THE HOSPITAL; DEMONSTRATOR OF ANATOMY AT THE
CHARING-CROSS HOSPITAL, AND FORMERLY HOUSE-SURGEON TO
ST. GEORGE'S AND THE WESTMINSTER HOSPITALS.

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CHARING CROSS.

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
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Those marked thus () have taken the Chair at the Anniversary Dinner.*

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R E P O R T.

THE number of persons admitted during this half year, exceeds that of the corresponding portion of the last year, 1839, by 307—viz. 24 In-patients, and 283 Out-patients.

was done on the 18th of April, but the instruments have since been considerably modified, and the operation has been rendered more simple, so that it may be readily accomplished in less than one minute, with the greatest precision and safety on an adult, offering no resistance; I have done it in a great many instances in half a minute, and it has even been done by Mr. Guthrie in a few seconds by one introduction of the small curved knife. But this method is not safe, for the ball of the eye may be injured by any irregular motion of the patient, which did occur in one unruly boy, but neither in this nor in any other instance has any evil result, or more than slight inflammation, followed the operation in the eighty-four cases in which it has been done in this hospital or in private life, nor in others in which I have assisted; and in no case has it failed in overcoming the immediate evil.

In squinting, the eye is turned either too much inwards or outwards; the eversion of it is, however, comparatively rare, not having occurred more than three times in one hundred instances. The inversion, or turning inwards of the pupil towards the nose, and sometimes a little downwards or even upwards, is more or less complete, constituting a greater or less *esotropia* in the eye as it is termed, and more or less of deformity. It is not like cataract in children, a frequent congenital complaint, or one with which they are born, although there are apparently exceptions to this rule; but it may be seen to take place almost immediately after birth, when the child has been thus early subjected to convulsions. It comes on more usually after the lapse of several months, and frequently from the third to the fourth year, and later; more rarely after the adult period of life. In one case the woman was thirty-seven years of age when it took place; it may occur at any age, and is almost always more or less complicated with imperfect amaurosis or defective vision.

I do not place much reliance on the usually received opinion of squinting being caused through imitation, although I do not deny that it may occasionally occur from such a cause; in which case a cure is sometimes effected, provided the complaint be treated as soon as it is perceived, by removing the child from the influence of the person imitated, by exercising the affected eye alone, by covering the sound one from time to time under proper regulations, and by attention to the general health. It is a work of time, and parents frequently abandon the case, from the difficulty and care required in the treatment. It is of importance, however, to parents who squint to be cured of the complaint, for I think I have seen it come on in their children, from hereditary predisposition rather than from imitation, although this may be doubted. When squinting occurs in children from teething, lancing the gums will generally remove it, particularly if followed up by a brisk purgative; and when it commences in consequence of

irritation in the alimentary canal, it may be cured if the patient is early submitted to a well directed treatment.

Injuries of the head, and blows on the eye, have been always recognised as a cause of squinting; which is also attributed to the almost constant use of a shade during long suffering from sore eyes, but as very few of those persons who have long worn shades do squint, I am not disposed to place much more reliance upon this cause, than upon the statement that the complaint was congenital. It is frequently found to follow whooping-cough, measles, and scarlet fever, when these diseases have implicated the brain.

When the sound eye is covered, the inversion or eversion of the pupil of the defective eye ceases, and the eye is restored, or turns to its proper and natural position, so that the person can then see with it, although more or less indistinctly; the moment, however, the sound eye is uncovered, the defective one returns again to its former squinting position, as if Nature intended that the defective sight of this eye should not interfere with the correct vision of the other. But that it does not entirely depend on this, is proved by the fact, that the patient continues to squint and the eye to turn on this trial being made, although vision should be entirely lost.

The case of Miss Paul, of Burleigh House, Little Chelsea, offers one of the most remarkable instances of improvement. She squinted badly with the left eye, and, when agitated, with the right also; she was near-sighted before the operation, and saw so little with the left eye, as not to distinguish objects with any accuracy. The operation was done on the 24th of June on the left eye, and she saw double for three or four days, but now she is not near-sighted, indeed she says she can see as well as any one else; and better with the eye which has been operated on than with the other. Formerly she moved the book on reading from the left to the right eye, and held it so close to the eye, as to render it disagreeable for any one to look at her; now she can read with the book on her knees. Her right eye rarely turns even when she is much agitated, but the left eye never, and her gratitude cannot be exceeded; she is now a very interesting and handsome girl.

Mary Morgan, 13 years of age, living at 37, Prince's Street, Vauxhall Road, squinted very badly with the left eye, and could scarcely see the letters of a book when the other eye was closed. She did not see double after the operation, had little or no inflammation, and could see almost as well with one eye as the other fourteen days afterwards, and much better with both than formerly. The great peculiarity in her case and in that of Miss Paul is, that they can move the eyeballs in every direction, inwards

as well as outwards, just as well, in fact, as if nothing had ever been the matter with them.

The degree of power which the person possesses over the eyes is occasionally very doubtful on the first inspection of them; both eyes squinting in turn, or together, and it is only after a little delay that the really defective eye can be clearly ascertained; whilst in others the motions of the eye are altogether so irregular, and so little under control, that it becomes doubtful which muscle should be divided, or whether it would be proper to attempt any operation at all, a point which further observation will I have no doubt enable us, even in these extreme cases, to decide. In most instances, persons have seen double for two or three days, or even for a longer time after the operation, but this gradually subsided in every instance, save one, as the axis of the affected eye began to correspond with that of the other. In the exception a slight cast can be perceived on a careful examination, so slight however as scarcely to be remarked. In one case the sound eye turns in more than the eye which has been operated upon, but vision is single. In four cases, the eyes seemed disposed to turn inwards again for a few days, but from this they eventually recovered, of which Miss Lucas, the governess of the Grey-coat School, Horseferry Road, is an excellent example. In two cases in which the first operation was not done in this hospital, it has been necessary to repeat them, and in two, I have made new pupils with complete success, in order to recover sight. In almost all, vision has been in a greater or less degree gradually improved, although the amendment of the appearance has been in some the essential point gained. In a few cases, the sight of each eye appears to be equally good.

In the case of Mr. B. son of Sir H. B. and in several others, the same decisive personal improvement has taken place, without so much amendment in sight, although the amelioration of it in all is progressive.

In the instance of Mrs. Meltus, living in Clerkenwell, whose squint came on at 37 years of age, after a hard labour, and remained for 17 years; the eye gradually turned a little outwards after the operation, and instead of a determined squint inwards, she now has a slight cast outwards, which I believe the division of the external rectus would remove, inasmuch as it has done so in another and similar case. She cannot see with this eye, or very indistinctly, from a cataract which it is not desirable to operate upon; but in order to understand this subject more clearly, it will be necessary to advert to the structure and motions of the parts concerned.

The apparatus for moving the eyeball, and for preserving its anterior surface under ordinary circumstances in a natural state, is composed of eight muscles, six of which are intended for the purpose of moving the eyeball, and two for opening and closing the eyelid. Four of the six mus-

cles which move the eye are called **STRAIGHT**, the remaining two, **OBLIQUE**. The four straight or recti muscles arise from the back part of the orbit, surround the optic nerve at their origin, and proceed forwards, being narrow and flat, to four cardinal points, like the North, South, East and West, and are called, from their position, superior, inferior, internal, and external. They resemble each other in most respects, and are about an inch and three quarters to two inches long in persons of a moderate size ; they become tendinous as they approach the anterior part of the ball of the eye, where they are firmly implanted on the surface of the strong inelastic outer or sclerotic coat around the cornea or bright part of the eye, constituting the tunica albuginea, and giving the peculiar colour to the white of the eye. If the internal straight or rectus muscle is one inch and five eighths long from its origin to the edge of the cornea in a young person, three eighths of the tendon are firmly implanted on the anterior surface of the sclerotica, two eighths may be considered free, being partly muscular, partly tendinous, and only slightly attached to the eyeball, behind which point it becomes entirely muscular, proceeding backwards to its origin. It is therefore at the distance at least of half an inch from the edge of the cornea that the muscle ought to be divided in this operation.

The superior straight muscle arises at the back part of the orbit, from the upper edge of the foramen which gives passage to the optic nerve, passes forwards in a flattened form, as all the straight muscles do, to be implanted tendinous on the upper part of the sclerotic coat anterior to the larger diameter of the ball. It moves the eye and turns the pupil upwards on being brought singly into action.

The inferior straight muscle arises below the optic foramen, passes under the eye to be inserted on the lower surface of the anterior part of the ball, and is the antagonist of the superior muscle.

The internal straight muscle arises on the inside of the optic foramen, passes forwards like the preceding, to the inside of the anterior part of the eye, and draws it inwards towards the nose.

The external straight muscle arises on the outer side of the optic foramen by a double origin, and is inserted in a similar manner to the others on the anterior surface of the ball. It draws the eye outwards or towards the temple, and is the antagonist of the internal rectus.

Each of these muscles contributes a little towards drawing the eyeball backwards, but when the four act together, the effect is very perceptible, and the eye is drawn directly backwards. It is most distinctly seen in persons who are about to undergo this, or any other operation on the eye, and are under more than ordinary alarm at the approach of the instrument. The horse, and other animals have a particular retractor muscle surrounding the optic nerve for this purpose, but which does not appear to be

necessary in man. When any two of the muscles act together, not being antagonists, such as the rectus superior and internus, the pupil moves in the line of neither, but in a diagonal line between them, that is upwards and inwards, as in prayer, or in the indication of any expression of countenance requiring "pathos," and which motion was formerly supposed to depend on the action of the superior of the two muscles remaining to be described, viz. the superior and inferior *oblique*.

The superior oblique muscle arises with the recti or straight muscles from the back part of the orbit. The other, the inferior oblique muscle, from near its anterior inferior and inner edge. The superior, however, by a beautiful and peculiar mechanism, obtains the action it would have had if it had arisen in front from the upper or corresponding edge of the orbit. The inferior oblique runs directly backwards and outwards from its origin, and passes under the inferior rectus, to be inserted into the sclerotic or outer coat of the eye on the inside of the rectus externus muscle, near the middle of the outside of the globe of the eye. If the action of the muscle be imitated on the dead body by gently drawing it towards its origin, the eye gradually moves and the pupil turns upwards and outwards; but if the muscle be more forcibly pulled in the direction of its course, the eye turns and the pupil is directed upwards and inwards, so that in fact this muscle ought to be called the *patheticus*, and not its antagonist the superior oblique, to which that name was formerly given. The peculiar mechanism I have alluded to in the superior oblique muscle, is the addition of a pulley attached to the inner and anterior part of the roof of the orbit near its edge, through which the small tendon of this muscle passes as through a ring, when it is reflected directly backwards and outwards, runs under the superior straight muscle, and is inserted into the outer part of the globe of the eye, not far distant from the insertion of its opponent the inferior oblique. Each of these muscles can singly draw the eye forwards. When they act together, they do it in a distinct and efficient manner, and are therefore the antagonists of the recti or four straight muscles, the effect of which I have alluded to under operation in drawing the eye backwards. When the patient ceases to use the recti muscles, the eye which has been drawn backwards gradually returns to its natural position, as a probable consequence of their relaxation; but the patient can more rapidly bring the eye forwards, when so disposed, by an effort of the will on the oblique muscles.

In many persons born blind with congenital cataracts, or with defective sight, a rotary motion of the eye on its axis is often observable, and which frequently remains, even if the patient is restored to good vision, and it is one reason for the performance of the operation for cataract in children at the earliest possible period after birth. This motion is presumed

to depend on an irregular action of the oblique muscles ; it is also seen in some cases of squinting, and is usually accompanied by a more than ordinarily defective state of vision. These muscles have been termed the slings of the eye-ball, but their actions have not been as yet duly appreciated, and and it is difficult to estimate what might be the direct line of influence of either of these muscles when any two of the recti were acting, which were not antagonist to each other. The superior oblique muscle, when drawn backwards in the dead body, before it passes through its pulley or ring, turns the pupil downwards and outwards, and is, I presume, with the rectus externus, greatly instrumental in leering, a motion not usually connected with any thing pathetic. Many physiologists, however, maintain that its real action in the living body is to turn the eye upwards and inwards, in the same manner as the inner fibres of the superior and internal recti muscles are supposed to do when they act together. In all probability the operations now performing on the muscles of the eye will in time clear up this difficulty, but I have not as yet met with a case in which I have found it necessary to divide others than the internal and external straight muscles, but I can readily conceive their occurrence. The seventh and eighth muscles belong to the eyelids ; the seventh raises the upper lid ; the eighth closes and compresses both lids against the eyeball. The globe of the eye is, however, surrounded by a quantity of fat peculiar to the part, through which all its muscles, nerves, and vessels run, and in which it may be said to be cushioned, allowing it to be pressed backwards by a blow, or drawn forwards by its own muscles, or to return to its place by the elasticity of this substance. The absence or diminution of this fat, gives rise to the sunken eye which accompanies a protracted and wearing disease. Its presence to the appearance of health, and natural prominence of the eyeball, which always when uninjured remains of the same dimensions.

The mandates of the will are conveyed to these muscles by a greater number of distinct nerves, than appear to be sent to any other part of the body of similar extent and importance. Actions and motions presumed to be involuntary are of frequent occurrence, and the sensibility of the organ, sometimes acute, and in excess, sometimes almost null, and derived from different nervous sources, marks in a clear and decisive manner the interposition of that power which nothing earthly can imitate or even understand. Three of the four straight muscles of the eye are moved under the influence of the third pair of nerves, called also the motor nerve, they are the superior, the internal, and the inferior ; the fourth or external rectus muscle is supplied by the sixth pair of nerves, directed, it may be said, solely to it, after communicating with the great sympathetic. The third pair also partly supplies the inferior oblique muscle, and the seventh muscle or the elevator of the upper lid. The superior oblique muscle has the fourth pair

of nerves sent to it alone, after communicating with the great sympathetic. The inferior oblique muscle receives also a communicating branch from the lenticular ganglion, constituted itself from the great sympathetic, and the nasal branch of the fifth pair, which are intrinsically nerves of sensation, in conjunction with a branch of the third pair, a nerve of motion. The third, the fourth, and the sixth pairs of nerves are then directed almost exclusively to the muscles of the eyeball, which receive also communications from the fifth pair and the great sympathetic. The muscle which raises the upper lid receives its nervous influence from the branch of the third pair, which supplies the rectus superior muscle, and thus connects them more closely in action in raising the lid and turning the eyeball directly upwards, whilst the orbicular muscle of the eyelids which closes them and shuts the eye, receives its nervous influence, inducing motion, from the portio dura of the seventh pair, and its sensation from the sensitive part of the fifth pair. The third pair of nerves, essentially a nerve of voluntary motion, has been, however, lately supposed, when minutely traced to its extreme originating points, to possess also an involuntary influence over the muscles and parts it supplies.

It is known to every one that strong stimulants applied to the nose cause uneasiness to the eye, and a considerable flow of tears, which not only run over the cheek, but pass through the regular lachrymal channel from the inner angle of the eyelids to the nose, probably with the view of washing away the matter which is unduly irritating the sense of smell residing in the *first* pair of nerves.

The *second* pair or the optic nerves are alone the seat of vision, as the first pair are that of smell; they are, however, indirectly connected with the nerves of motion going to the muscles of the eye, through the lenticular or ophthalmic ganglion, which supplies the treble influence of the great sympathetic, of the third pair and of the fifth to the eyeball, through the long and short ciliary nerves it sends to the internal parts of the globe. But the sympathy between them is rendered very evident in many states of disease of the eye, and particularly when its muscles become paralytic, and the upper eyelid falls.

The first, second, third, fourth, fifth, sixth and seventh pairs of nerves from the brain and the great sympathetic are all then more or less directly connected with the action and motions of the eyeball. It is very difficult in particular to indicate why the third pair of nerves should supply three of the straight muscles, and not the fourth; or why the external rectus muscle should have the sixth pair of nerves to itself; why the superior oblique muscle should have the fourth pair of nerves sent to it alone, whilst the inferior oblique muscle is supplied both by the third pair and the lenticular ganglion, which is itself in direct connexion also with

the third pair, with the nasal of the first branch of the fifth and the great sympathetic, of which it is essentially a part; and through which means this great nerve regulates the sympathetic system of the eye and its appendages, in the same manner as it is supposed to do, the due performance of the functions of every other part of the body.

It is unnecessary to allude to the more indirect communications which take place between the nerves going to the eye and its appendages, and the eighth and ninth pair of nerves from the brain, and those from the spinal marrow. Some late observations of Dr. J. Budge appear, however, to throw a clearer light on the connexion or sympathy always known to exist between the nerves of the intestines, which are primarily derived from the great sympathetic and the spinal marrow, and which bear on this present subject. He appears to have shewn, by a series of experiments on animals, that the motions of the stomach and intestines, necessary for complete and perfect digestion, depend on the spinal marrow, and are referred ultimately to particular parts in the centre of the brain, as points of concentration. The corpora quadrigemina and the corpora striata form, according to his experiments, the central organ for the motion of the intestinal canal, whilst the central organ for the motion of the stomach, is in the right corpus striatum. The sympathy between the intestines and the eye, is thus clearly explained, from the immediate vicinity of the origin of their nerves and from the connexion which may fairly be supposed to exist between them; for as little doubt has been entertained that squinting, and the defective vision which usually accompanies it, are caused by some affection of the brain, excited primarily through the medium of the organs of digestion, it is very satisfactory to have a more intelligible explanation of the means by which the mischief is effected, than has hitherto been distinctly offered.

The eye, thus provided with the means of motion and sensation, is greatly protected from undue external irritation and violence, by the eyelids, to which it is principally connected by the conjunctival membrane, which having lined the lids, is reflected over the anterior part of the ball of the eye, and the fold of reflection can be distinctly seen at all times at the inner angle, where, from its shape, it is called the semilunar valve, or fold, and at the under part, by depressing the lower eyelid, when it is seen to pass from it to the inferior part of the ball, covering and adhering to that portion of the tendons of the recti, or straight muscles, which form the tunica albuginea, or white of the eye. The sensibility of this membrane is derived from the fifth pair of nerves, is of a very peculiar kind, and is excited so as to become extremely great under particular circumstances, the membrane, under ordinary ones, as well as the eyeball, being comparatively insensible. The opinion usually entertained of the exqui-

sensibility of the eye, has arisen from the pain which is felt on the admission of a small piece of dirt, or a fly, between the eyelids; but this occurs from a wise and preservative provision of Nature, on account of the insensibility of the eyeball itself. Let the eyelid be raised, and the same piece of dirt applied to the surface of the eye, no pain, and scarcely a sensation, will be produced; remove the foreign substance, turn out the lid, and whilst it is retained everted, place it upon it, and no greater sensation will be induced than is felt when it is applied to the eyeball. The inference is, that both surfaces, when touched separately, are nearly insensible to this species of irritation. But let the same piece of dirt be introduced between the eyelid and the eyeball, and the sensation produced will become exquisitely painful. To give rise to this sensation it is necessary that the two surfaces should come in contact, and that the foreign body should be grasped between them. If this were not the case, an irreparable injury would often occur to the transparent part of the eye before it would be observed, and if the raising of the lid and the separation of the surfaces did not nearly annul sensation, an operation could not be performed for cataract nor for squinting; for who could bear quietly the sensation which must arise from pushing a needle or a hook into the eye, if it were analogous to that arising from a fly, or a dry solid substance between the eye and the lids? The experiment may be tried in a very simple and conclusive manner by any one on himself, by merely keeping the lids apart by an effort of the will, when the end of the finger may be placed boldly on the eyeball without any inconvenience. Inflammation, by enlarging the vessels, gives rise to pain in the same way, and the sensation is at first as if some extraneous matter were interposed between the lids.

Strabismus, from *strabizo*, to squint, is usually supposed to depend immediately on a too powerful action or contraction of the muscle of the side towards which the eye turns: inversion, for instance, on an augmented action of the internal rectus muscle, and eversion, on a similar increase of power in the external rectus muscle; but I have reason to believe that this is certainly not always the case, and analogy renders it extremely doubtful in many instances.

When the mouth is drawn to one side, as it frequently is, in consequence of defective power in the *portio dura* of the seventh pair of nerves supplying the muscles of one side of the face, the side really affected is perfectly quiescent, and nearly motionless, and the deformity takes place on the sound side, in consequence of the muscles acting, whilst those on the other offer no opposition. They have ceased to be antagonists, and when these persons laugh the mouth goes to the sound side, because the muscles of the affected side do nothing, instead of taking an equal share in the process, and widening the mouth from ear to ear.

In the complaint called wry-neck it is different, and occurring, for the most part, from a different cause. The sterno-cleido-mastoideus, the great muscle on the side of the neck, may be felt to be thickened, hardened, and contracted, and the division of it relieves the part and effects a cure. I assisted in doing this, in a very difficult case, three years ago, which perfectly succeeded, and I have one now under my care which I mean to operate upon as soon as the patient's health will admit of its being done.

In the operation for squinting, the muscle usually divided does not appear to be in the least diseased, but on the contrary to be quite in its natural state; giving rise to the suspicion, that it is certainly not always in fault, and that the defect has taken place in many instances in its antagonist muscle, in the same way as it occurs in the case of paralysis of one side of the face. The deficiency of power may be in various degrees, and when the effective and healthy muscle is divided, it does not follow that its opponent should be able to act, so as to cause a squint in the opposite direction. If in paralysis of the face of one side, the portio dura of the seventh pair of nerves were divided on the other side, the mouth, on an attempt to laugh, would remain stationary: it would move neither way, or in a very slight degree. It is on a similar principle that on the division of the internal straight muscle of the eye, it does not roll permanently outwards, but generally attains, after the first effects have subsided, a central position only. It must however be admitted, that if the influence of the external rectus is only partially weakened, the eye may be turned outwards, as I have shewn did permanently occur in two instances, and may occur in others. It is but rarely entirely destroyed, for the eye can almost always be moved outwards, and sometimes has a tendency in that direction for several days, but it must be borne in mind, that it is only a muscle and not the trunk of a nerve which has been divided, and that the inner fibres of the superior and inferior recti muscles may be in some degree antagonizing forces, calculating but little on the oblique muscles which may exert an influence we cannot fairly estimate. The posterior end of the divided muscle is soon united to some part within the orbit, and unless it is pushed well back at the conclusion of the operation, it may be united to the ball of the eye, near where it was divided; so that its power may be only diminished, not cut off, and this may be a sufficient antagonist for the weakened opponent, or even cause the slight east which has been observed to take place in some cases of this kind when a second operation for the division of this adhesion has even been found necessary, and has proved successful.

When a child under eight or ten years of age, or an unruly one who may be older, of which we have had one instance at seventeen, is the sub-

jeet for operation, it must be secured in the same way as in the operation for cataract, by being laid on a narrow table and covered by a strong sheet, which ought to be tied firmly underneath. The head is to be placed on a pillow, and steadily held by a spare assistant, whilst another, if necessary, further secures the body; for children of four or five, are sometimes so strong, and resist so much after the operation has been begun, as to render it very difficult to complete it, unless perfectly mastered, when they become comparatively quiet. In the first case of this kind, the muscle was not divided, and the operation had to be repeated. The youngest child I have operated on was two years and three months old, the two next youngest were four years old: one, Henry Grimsey, is in Saint Martin's Workhouse; the other, Elizabeth Haines, lives in Flint Street, Blackfriars, and both are now handsome children. The operation has been done at five, seven, and indeed at all ages upwards, and there does not appear to be any difference between the sexes, or much in favour of either eye. I cannot exactly say at how early an age the operation ought to be done, but I have declined doing it on infants under a year old, although I should not hesitate to operate for cataract on a child of three or four months old; not that the operation is so severe, but that it is more easily done at a later period. It did not affect the health of an infant four months old sucking in the arms of its mother Ann Sharp, 10, Engine Court, Skinner Street, who began to squint inwards at three years old with the right eye, and sometimes a little with the left. Fourteen days after the operation her husband expressed his great satisfaction at the beautiful cure, to use his own words, his wife had received, and I trust I have added to their matrimonial felicity.

When the patient is an adult he should be placed in a high-backed chair with the head reclined. An assistant raises the upper lid in the gentlest manner, with the ordinary silver elevator used for the same purpose in cases of soft cataract in children, holding it with one hand nearly perpendicularly to the forehead, and desiring the patient to turn the eye *outwards* in a case of squinting *inwards*, fixes a strong double hook with the other hand into the tunica albuginea, through the conjunctival membrane a little distance from the cornea, in the middle line of the eye, or what is pedantically called its equator. The points of the hook are short that they may not enter the sclerotic coat, but they are long enough to pierce the tunica albuginea, for if they only penetrate the conjunctival membrane, this slips, and they raise it from the ball and cause its elevation near the cornea, which delays the cure. The assistant must also take care that the elevator duly raises the lid and gently confines it against the edge of the orbit in such manner that it may not slip, nor allow the upper conjunctive fold or part of the internal portion of the lid to bulge out below it, which will be apt to occur unless it is carefully prevented, by holding the

elevator in the manner directed. On the right eye the elevator is to be held in the left hand, the hook with the right, and vice versa. The operator (or an assistant) having depressed the under eyelid with the fore or second finger of the left hand, directs the assistant to draw the eyeball gently outwards with the hook, until the semilunar fold of the conjunctival membrane begins to yield to the traction, when it should be held perfectly steady on the middle line, the centre of the pupil being directly under the shaft of the hook. He then makes an incision nearly equidistant from the hook, and the edge of the semilunar fold, through the conjunctival and the cellular membrane which may intervene between it and the tendon of the rectus muscle, directly upwards and inwards towards the orbit. Some surgeons use a small straight knife for this purpose, some a pair of scissors, in which case the conjunctival membrane may be raised by a pair of eye forceps at the semilunar valve, and the fold thus formed between it and the hook divided; but I generally cut through this part at once with a small curved knife, which is introduced under the conjunctiva, from below the line of the hook, the point being brought out upwards through the membrane, or with scissors convex on the lower edge, and cutting sharply up to the points which are blunt. The incision is to be enlarged upwards and downwards if necessary to at least $\frac{3}{8}$ ths of an inch in length, which exposes the tendon of the muscle going to be implanted into the outer or sclerotic coat, and which is made more distinct by the point of the knife or scissors whichever are used, or by the blunt end of the small, flat, curved and slightly grooved director, for which the knife is to be exchanged, and any blood which flows is to be taken up with a small piece of sponge. If the incision is made too close to the semilunar valve, the subjacent cellular membrane frequently becomes infiltrated with blood, and prevents the muscle from being seen, which does not occur when the incision is made at a greater distance from it, but this need not delay the operation. The curved director is now to be introduced by a gentle steady motion beneath the tendon, carrying it inwards rather deeply through the cellular membrane and fat, so as to be passed under the muscular, as well as the tendinous part, which causes the eye to roll a little inwards: and which should not be prevented by holding the hook too firmly. The point is then to be raised by depressing the handle, when it will appear at the upper part of the incision, having the muscle on its grooved surface; and this elevation of the tendinous attachment of the muscle turns the eyeball outwards, so that the hook is, in fact, no longer necessary, and may be dispensed with after the first incision is made through the conjunctival membrane: and in very determined persons it may be dispensed with altogether. The director being now held in the left hand over the lower eyelid, the curved knife is to be run along the slightly marked groove

of the director, and the muscle becoming tendinous is divided. The operation may be done throughout with the same pair of blunt ended curved scissors with which it was begun, the lower convex limb being gradually introduced under the muscle in the same manner and with the same precautions as the director. When the muscle is fully divided there is usually a small spurt of blood, which I consider a satisfactory sign, but which soon ceases to flow, and the eye is generally observed to turn a little outwards, but not always forcibly. The elevator should then be removed, when the upper eyelid falls, and the eye is to be sponged clean. The patient should now be desired to open the eye by raising the lid, and to turn the eye inwards; if he cannot do this the operation has been completed, but if he can do it in the slightest degree, the muscle or its lateral cellular or tendinous attachments have not been entirely divided, and the eye being again secured by the fore-finger or the elevator, the scissors are to be used, or the director is to be once more introduced, and the undivided part sought for and incised, when it will be found that the patient can no longer turn the eye inwards, and it is surprising how small a portion of attachment can do this, either on the under or upper part. In the earlier operations performed I was not aware of this circumstance, and in two cases in which a slight turn *inwards* re-appeared a fortnight after the operation, I attribute it to this portion of membrane, which in all probability adhered to the posterior end of the divided muscle. It may also effect this slight turn from its connexion either with the rectus superior above, or the inferior below, as the case may be. In five of the cures performed the eyes would not at first turn outwards, although the sclerotic coat was rendered distinct to all present, for nearly three-eighths of an inch every way, which indeed ought always to be done to ensure success in doubtful cases, and it was only by dividing the additional band of membrane or tendinous expansion I have alluded to in three cases upwards, and in two downwards, that the operations were perfectly completed. The posterior cut end of the muscle is to be pushed backward by the director away from the other portion, and from the ball of the eye, so that it may unite indirectly to the posterior part of the globe and not to its side, and the edges of the incision in the conjunctival membrane are to be adjusted by the end of the same instrument. The eyes are then to be closed, by a small pad and a bandage, passed around the head; the pad of the eye operated upon should be kept wet with cold water for the first twenty-four hours, and the eye occasionally closed for two or three days. These precautions are not absolutely necessary, for many poor people have returned to their work the next day, but it is as well to observe them, and to apply a few leeches to the lower lid, if there should be either pain or swelling. The cut edges of the conjunctiva are prone to retract and swell and become elevated,

whilst a small projection or growth takes place from the sub-conjunctival cellular membrane, which requires to be touched from time to time by the sulphate of copper, or the nitrate of silver, or even to be cut off with the curved scissors. The inner part of the eye is bloodshot occasionally for some days. The operation is but a trivial one, and is not apparently very painful. Mr. S., the oriental traveller, says he was more frightened than hurt by it.

The operation on the external rectus muscle is, if anything, more easily done than on the internal muscle.

James Maldhouse, aged 22, residing at 17, St. Martin's Lane, began to squint at two years old with both eyes, in consequence of fits under which he still occasionally labours, one eye always turning out when the other is directed at any particular object; this occurs to both eyes although he thinks he can see best with the right one. Last Christmas he had the misfortune to be scalded in the face, and the right half of his mouth was allowed to grow up, so that he eat with difficulty and had altogether a very odd appearance. Being most anxious to be relieved from the deformity of his mouth, Mr. Guthrie made a new half to it, by dividing the parts which had united, and then bringing the inner membrane outwards and keeping it in that situation. In consequence of the success of this operation, he was induced to allow the external rectus of the left eye to be divided, when he immediately looked straight with that eye, and so much more so with the other, that his mother scarcely knew him. As it did not however become quite straight, he wished to have the operation performed on it also, which I have done, using only the elevator and scissors without the hook or director, and I could have dispensed even with the elevator. He now sees straight with both eyes.

When the assistant has been accustomed to raise the lid with the forefinger, and knows how to do it, the silver elevator may be dispensed with in an adult, but the operation is most easily done with the elevator, hook, and director: and as it can be done in half a minute with perfect safety, with little pain, and without fear of any evil consequences, I do not know what more can be desired.

The most extraordinary case I have met with is that of Elizabeth Burford, 14 years of age, a tall and rather good-looking girl, now in the Hospital. She came from a village beyond Tonbridge, nearly blind with cataracts and squinting horribly with both eyes, both of which complaints were perceived at five months old. On the right eye being operated upon, the pupil became rather everted, as if the external rectus acted vigorously. The left eye was so determinedly turned inwards, that the edge of the cornea or bright part of the eye could alone be seen, and she had no power over it. Under these circumstances it became necessary to fix a hook into the

outside of the eye and draw it outwards, until another hook could be introduced on the inside in the proper place. On the division of the inner straight muscle, the eye turned towards the centre, but not in the least outwards, as the other eye had done. It was supposed that a part of the muscle might have been left undivided, or that some cellular or tendinous expansion might remain attached laterally to its posterior part, and thus act with it; nothing of the kind could however be found, and the sclerotic coat was laid bare for the extent of half an inch in every direction under where the muscle is situated, and its yellowish color was an object of general remark; the eye however still retained its central position, the external rectus seeming to have lost all its influence. The cataracts were broken up at the same time, one on the ninth day after the previous operation, the other on the fourth. I have since divided the external rectus muscle of the right eye, and she now sees perfectly straight with it, and is capable of moving it a little in every direction. I have every reason to believe this girl will be sent home seeing as well as persons operated upon for cataracts usually do, with her eyes in a natural and proper direction, and capable of getting her bread.

In this third edition I have endeavoured to make some minute points, relating to the operation more intelligible to the professional, as well as to the general reader; and I hope to be able to submit to the Governors of the Hospital, some further observations on a future occasion.

CHARLES W. G. GUTHRIE.

August 12th, 1840.

Fig 1

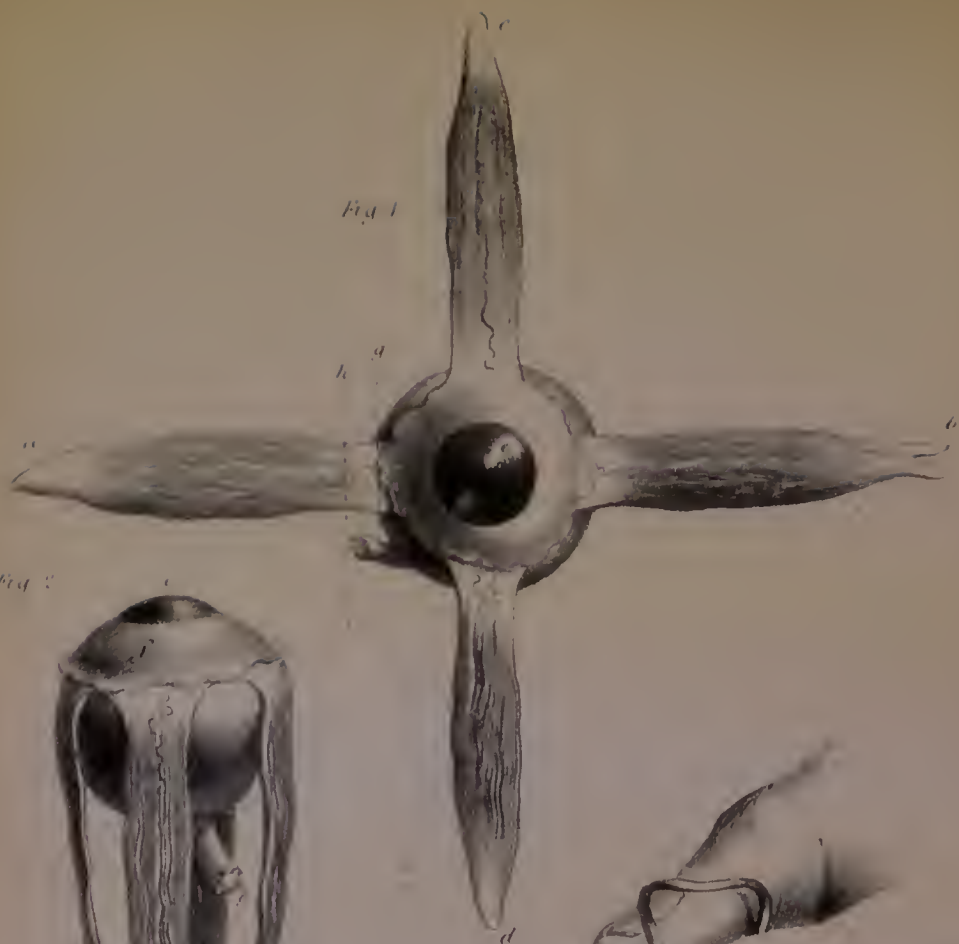


Fig 2

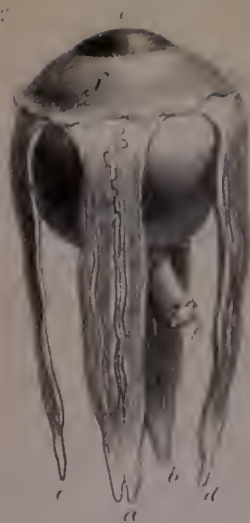


Fig 3



REFERENCES TO PLATE.

FIG. I.

- a*, the internal straight muscle.
- b*, the external straight muscle.
- c*, the superior straight muscle.
- d*, the inferior straight muscle.
- e*, the cornea, or bright part of the eye.
- f*, the tunica albuginea, or white of the eye.
- g*, the line of the first incision.
- h*, the line of division of the internal straight or rectus muscle.

FIG. II.

- a*, the external straight muscle.
- b*, the internal straight muscle.
- c*, the inferior straight muscle.
- d*, the superior straight muscle.
- e*, the cornea, or bright part of the eye.
- f*, the tunica albuginea, or white of the eye.
- g*, the optic nerve.

FIG. III.

- a*, the elevator properly applied and raising the upper lid.
- b*, the hook affixed in the white of the eye, and slightly flattening it.
- c*, the fore-finger of the operator, or of an assistant, depressing the lower lid against the edge of the orbit.
- d*, the semilunar fold or valve drawn outwards by the turning of the eyeball under the hook.
- e*, the cornea, or bright part of the eye.
- f*, the white of the eye.
- g*, the first incision through the conjunctive membrane drawn a little outwards by the hook.

ADDRESS of the COMMITTEE of the ROYAL WESTMINSTER
OPHTHALMIC HOSPITAL to the Governors, at the General Meeting
on the 25th July, 1840.

Sir J. SWINBURNE, Bart. in the Chair.

THE Committee beg leave to state to the Governors, that since the 1st of January, 1840, the number of Applicants has greatly increased, being at the rate of 600 for the year above the great increase of last year, and the number of urgent cases, many coming from distant parts, whom it is desirable to admit as In-patients, is so considerable, as to render it very distressing to the Medical Officers to be obliged to refuse admission for want of the means of supporting them. The Committee have therefore decided on augmenting the number of In-patients from 10 to 18, by opening two of the four wards remaining unoccupied; and they entreat the co-operation of the Governors and their friends to obtain funds amounting to 150 pounds per annum, to be raised by additional Subscriptions or by Contributions to the Inalienable Fund: and the Committee earnestly recommend attention to this Fund, the augmentation of which to £10,000. would render inestimable advantages to the indigent Blind, and establish the Hospital on an indestructible footing.

The poor in London are received on their own application as out-patients without letters of recommendation, and those in the country requiring operation will be admitted after a previous application of the clergyman, or duly constituted authorities of the place, to the Secretary.

Contributors of twenty guineas become Life Governors, or by the payment of two guineas annually; but the smallest donation will be gratefully received.

(By order)

T. R. FOWLER, R.N. Sec.